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Biodiversity conservation across scales: lessons from a science–policy dialogue

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Abstract

One of the core challenges of biodiversity conservation is to better understand the interconnectedness and interactions of scales in ecological and governance processes. These interrelationships constitute not only a complex analytical challenge but they also open up a channel for deliberative discussions and knowledge exchange between and among various societal actors which may themselves be operating at various scales, such as policy makers, land use planners, members of NGOs, and researchers. In this paper, we discuss and integrate the perspectives of various disciplines academics and stakeholders who participated in a workshop on scales of European biodiversity governance organised in Brussels in the autumn of 2010. The 23 participants represented various governmental agencies and NGOs from the European, national, and sub-national levels. The data from the focus group discussions of the workshop were analysed using qualitative content analysis. The core scale-related challenges of biodiversity policy identified by the

participants were cross-level and cross-sector limitations as well as ecological, social and social-ecological complexities that potentially lead to a variety of scale-related mismatches. As ways to address these challenges the participants highlighted innovations, and an aim to develop new interdisciplinary approaches to support the processes aiming to solve current scale challenges.

Keywords
Biodiversity conservation, environmental policy, governance, scale sensitivity, scale challenge, stakeholders, academia, EU

Introduction

The year 2010 marked the deadline for the political targets to significantly reduce and halt biodiversity loss at global and the EU levels, respectively. Despite the efforts to date, assessments from global to local levels still document significant losses of diversity across spatial and temporal scales with potentially serious consequences in terms of provision of ecosystem services (GBO3 2010). Acknowledging the failure to achieve the 2010 targets, a set of new conservation targets, the Aichi targets of the Convention on Biological Diversity (CBD), have been adopted for the period 2011–2020, by the international community, including the EU (CBD 2010, EC 2010, Mace et al. 2010). In addition, preventing the degradation of wider ecosystems and their services has been incorporated in both global and the EU agendas in order to reach the set targets by 2020. Successfully meeting these ambitious targets requires critically reviewing existing and emerging biodiversity policies to improve their design and implementation based on the lessons learned.

Mismatches between the scales at which ecological processes take place and the levels at which policy decisions and management interventions are made are amongst the main shortcomings of current biodiversity policy regimes (Crowder et al. 2006, Cumming et al. 2006, Folke et al. 2007) and can be considered as one of the main reasons why the 2010 targets have not been achieved so far (Planet under pressure 2012a, b). The policies and decisions that shape human activities driving biodiversity change operate at many administrative levels, employ a range of instruments at different scales, and involve a variety of governmental and non-governmental actors (Young 2002, Young et al. 2005). These actors often have different insights in to what constitutes a scale-challenge and how to deal with it, inevitably leading to contrasting opinions. Because of this divergence of views, deliberative discussions between stakeholders provide a promising way to identify options to overcome current scale-related challenges. Accordingly, the SCALES project (Henle et al. 2010) organized a stakeholder workshop with governmental and non-governmental actors in Brussels (21/09/2010). The goal of the workshop was to encourage science-policy dialogue and to share opinions and perspectives on scale challenges and scale mismatches, between and among representatives from EU and national administrations, including ministries, environmental NGOs, and academics of various disciplines

with working experience at national and EU levels. This paper provides an overview of the outcomes of the workshop, and suggests some directions towards meeting scale challenges and reducing scale mismatches.

Theory

Scale has been used in numerous ways: by referring to various sizes (small and large), to hierarchical structures composed by different levels, and to non-linear relationships taking place between and within various levels (Sayre 2008). In this paper, following Gibson et al. (2000) and Cash et al. (2006), scales are explored as simultaneously occurring dimensions (e.g., spatial and temporal) describing entities (e.g., levels of biological organisation, levels of governance systems) that have evolving interactions between each other. This approach is useful to analyse and support multi-level governance of biodiversity conservation, as it facilitates the understanding of how ecological processes and societal decisions and actions take place at, and across, many different scales. Additionally it highlights how scale-dependent these processes are, and how better decisions and improved practices could be developed (Cash et al. 2006, Gibson et al. 2000).

Different ecological processes and ecosystem functions occur at different temporal and spatial scales (Peterson et al. 1998). For example, habitat requirements for species may change with scale (Altmoos and Henle 2010) and understanding the viability of populations requires an assessment of processes at different scales (Kleyer et al. 2007). Likewise, the time lags in responses of species to fragmentation may be considerable (Henle et al. 2004). Moreover, biodiversity loss and ecosystem change are outcomes of multiple direct and indirect drivers that operate simultaneously and interactively at various scales. Some drivers that directly affect biodiversity show high scale sensitivity, i.e., they are spatially differentiated across administrative levels (Moss and Newig 2010). Characteristic example of such scale sensitivity is wetland loss, which in the EU shows a strong spatial unevenness at the national level, predominantly concentrated in central and eastern EU countries, but seems to be a much more widespread phenomenon when it is observed at lower administrative levels (at sub-national or local levels) (Figure 1). Analysing, understanding, and overcoming these ecological scale-sensitivities requires combining ecological knowledge with information, awareness and experience of actors at various governance levels thus directly bridging science and policy discourses.

Biodiversity policies do not always take into account the scale-dependence of ecological phenomena and anthropogenic activities (Henle et al. 2010). For example, the costs of conservation tend to occur at the local level, whereas benefits of biodiversity conservation, and related ecosystem services, reach far beyond municipal or private–property boundaries to regional, national, or even global levels (Perrings and Gadgil 2003, Ring and Schröter–Schlaack 2011, Santos et al. 2012). Policies and measures for their implementation are also often inadequately coordinated across geographical regions or

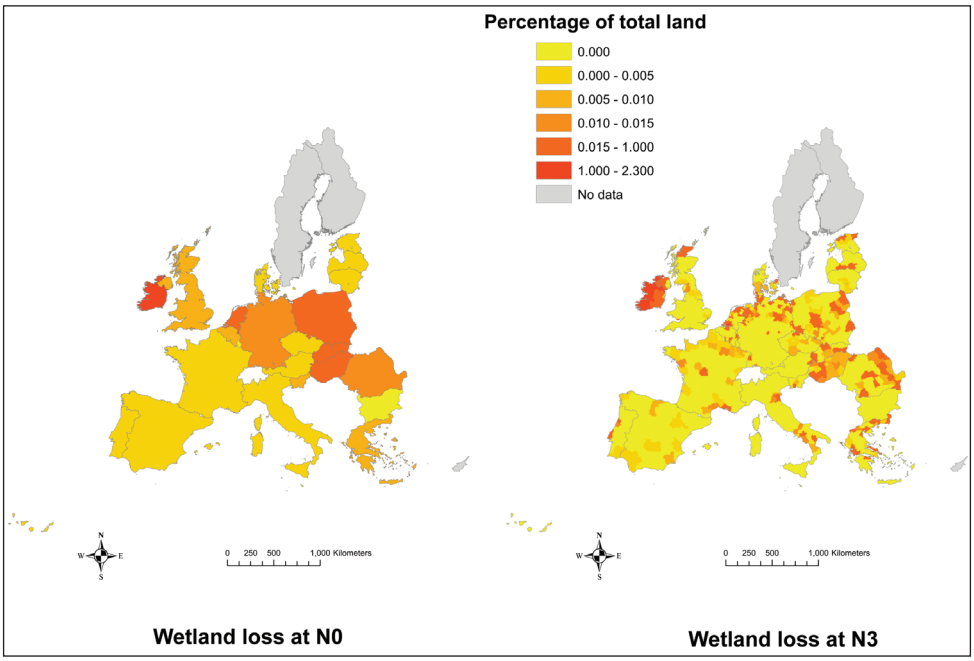

Figure 1. Changes in evenness of drivers: loss of wetlands across the EU. Abbreviation NUTS (Nomenclature of Territorial Units for Statistics) refers to the regional classification within the EU, from country level (NUTS 0) to small regions (NUTS 3). The numbers show the hectares of wetland loss as a percentage of the total land in the respective NUT.

administrative levels (Cash et al. 2006). For example, the implementation of existing key EU policy instruments for biodiversity conservation, i.e. the Birds and Habitats Directives and national laws for nature conservation, tend to focus on ensuring conservation of specific 'ecological units', (e.g. primarily protecting particular species or habitats in distinct areas without paying enough attention to wider spatial scales and the broader social-ecological systems relevant for conservation efforts (Paloniemi and Tikka 2008, Grodzińska-Jurczak and Cent 2011, Apostolopoulou et al. in press). Similarly, temporal mismatches constitute a significant scale challenge, for example time scale of biodiversity conservation does not always match with the fixed electoral cycles or the tendency of governance systems to respond to immediate, short-term economic interests.

To add to the above described complexity, coordination between different policy sectors and jurisdictional levels has often proved to be inadequate. Characteristically, biodiversity governance still has little impact on other policies influencing economic activity and land use, such as the Common Agriculture Policy (CAP), Common Fisheries Policy, transport, planning or energy policies. Policies distantly related to biodiversity conservation often have goals contradictory to safeguarding biodiversity; for instance, a governmental priority for development plans has in many occasions resulted in planning policies which hinder the enforcement of conservation measures and sustainable land use rules (Apostolopoulou and Pantis 2009). Even though

some more recent policies, such as the EU Water Framework Directive (WFD), the Marine Strategy Framework Directive (MSFD) or the EU directives on Impact and Strategic Environmental Assessment, aim to integrate biodiversity conservation into other policy sectors, the actual success of such policy reforms depends on the degree of 'fit' with existing institutional structures and practices (Moss 2004). Solving these multi-level and cross-sector challenges requires, inter alia, the active participation and involvement of stakeholders from different sectors as well as from different jurisdictional and societal levels.

Material and methods

To foster an open science–policy dialogue and to explore topical and innovative ideas for better integration of scale-related issues into biodiversity policy and governance in the EU and Member States, we invited 23 stakeholders to an expert workshop in Brussels. The participants were selected to establish a diverse group of stakeholders, covering both Member States and EU level. These participants included representatives from different Directorates-General (DGs) of the European Commission, from a number of environmental NGOs operating at EU level, and from Finland, France, Germany, Greece, Poland and UK. The national level participants were from ministries, national level NGOs, and sub-national level agencies implementing biodiversity policy.

We divided the stakeholders into four small groups, each including approximately 6–7 participants from the EU level institutions and from several Member States. Each group participated in two deliberative discussions, following brief introductions to the aforementioned scale issues. The first discussion explored how effectively existing policies address scale-related issues (at EU, national and sub-national levels). The second discussion aimed to explore new policy solutions for addressing the identified scale-related challenges. The discussions were facilitated and documented by some of the authors (2 researchers were participating in each group).

The discussion topics addressed scales, and whether it was a neglected issue in current biodiversity policy and governance, what were the key reasons for and barriers to addressing scale-related issues, and what the biodiversity challenges post-2010 are with specific attention to how addressing scales could help overcome the problems identified. Each discussion lasted c. 90 minutes and all discussions were recorded and reported by taking extensive notes. The discussions were analysed following the method of qualitative content analysis (Miles and Huberman 1994): a list of viewpoints was compiled and iteratively reorganised by aggregating similar statements into broader categories until a few different categories were formed. The aim of the analysis was not to compare or count the opinions of various participants, but to find out schemes helping to solve scale challenges considered as relevant. The results of the analysis were discussed with the co-authors during the process of analysis in order to overcome possible bias.

Results and discussion

Scale challenges in biodiversity policy and governance

The dimensions of complexity

The stakeholders generally agreed that dealing with a number of different scales and their interactions simultaneously is a demanding, but important undertaking, and thus they supported the complex scale interpretation of Gibson et al. (2000) and Cash et al. (2006) even if a variety of definitions of scale concepts and challenges was reported. In particular, our analysis led to the categorization of stakeholders' perceptions into three broad dimensions of complexity: ecological, social, and social-ecological which could accordingly lead to several types of mismatches either within or across the governance scale or between ecological and governance scales.

On one hand, the participants highlighted that current policy frameworks do not possess the necessary 'scale-sensitivity' to address the inherent complexity of ecological phenomena and to take into account species and ecosystem processes that operate at different scales, and especially their relationships with fragmentation and connectivity. By underlining these aspects, the participants paid significant attention to the need to more explicitly consider ecological scale in biodiversity governance (e.g., Henle et al. 2004, Beunen and de Vries 2011).

On the other hand, the participants stressed that when considering interactions between different governance levels, it is important not to 'skip' a level but rather to take the whole spectrum of governance into consideration. In many occasions, they emphasised the complexity involved in implementing multi-level and adaptive governance approaches especially when the focus lies on the management of both social and environmental change and uncertainty across scales (Armitage et al. 2009, Leach et al. 2007). However, the participants expressed different views regarding whether scales are (or are not) necessarily always organized hierarchically or more dynamically. Some research participants argued that besides paying attention to formal administrative levels and institutions it is crucial to acknowledge that complex networks of different social groups or citizens organizations can occasionally directly link different levels, e.g. the local level may be directly linked to EU level hence by-passing the intermediate level(s). This finding concerning the role of groups and organisations that are acting between and at different levels (c.f., Swyngedouw 2004) complement the hierarchical and formal ways to acknowledge biodiversity governance. We believe that this aspect is important especially in transitional phases of governance, e.g., in periods of crises or in the framework of significant natural resource conflicts (see also Apostolopoulou and Pantis 2010).

Moreover, the participants often paid attention to the role of economic factors in the emergence of challenges in biodiversity governance. They identified the failure to link biodiversity (and its multiple values) to broader socio-economic benefits as a basis for conservation. It was argued that if biodiversity considerations are to be mainstreamed in decision making, then information about the complex roles of biodiversity

and ecosystem services in supporting sustainable socio-economic systems at local, sub-national, national, and international levels should be generated and widely disseminated. This was considered as an important task, requiring a considerable amount of efforts in order to be reflected in the goals of conservation policies.

Cross-level and cross-sector limitations

The participants identified difficulties in integrating biodiversity conservation objectives set by EU, national, sub-national or local levels into the objectives and decisions at other levels. The integration of objectives between local and sub-national levels on the one hand, and the EU level on the other, was considered as especially problematic. In particular, the participants often questioned the dominant position of the EU-level actors in developing the objectives for biodiversity policy. They argued that too often local level actors were overlooked in governance processes.

In many occasions, research participants argued that the main barriers to cross-level biodiversity governance are related to structural issues and relevant 'governmental attitudes'. A recurrent statement in the discussions was that "*the EU only talks to the national level*", referring to the difficulties in incorporating EU level goals into the sub-national and local policies and vice versa. The participants also pointed out the difficulties and apparent failures in taking national characteristics into account when developing and implementing EU policy instruments. For example, while the Habitats Directive forms a legislative basis for conserving species and habitats of EU interest it does not directly provide for protecting species and habitats important at national level (e.g., nationally threatened or endemic species). It also does not take into account the specific socio-economic contexts affecting conservation in different Member States. Furthermore, the implementation of EU policies falls under the competency of the Member States or the competency of the sub-national level (e.g. the Länder level in Germany). The latter case results in a divergence between implementing institutions at sub-national levels and national levels responsible for reporting on the overall Member States' performance to the EU level, possibly leading to conflicts and confusion between actors. However, Natura 2000, the EU-wide network of conservation areas, and the main actions of National Biodiversity Action Plans, were seen in some cases as relatively successful in translating high-level aims (EU and national) into effective action at local levels. Moreover, EU policy frameworks, such as the Natura 2000 network or the Water Framework Directive, were considered by some participants as signs of a wider international reconfiguration and rescaling of power centres (including the reconfiguration of the EU's role) and decision-making processes (see also Kaika 2003).

Despite different opinions regarding the above issues, the majority of participants agreed that even when there were local-level successes, these were too infrequently 'scaled-up' efficiently to national or EU levels. Thus, the findings underline a need to pay more attention to power positions of actors acting on various governance levels

and having crucial roles in supporting and/or limiting successful processes of scaling up and down (see also Chmielewski 2007, Rands et al. 2010).

The participants also asserted that the numerous problems of biodiversity conservation are related to the failure to integrate biodiversity conservation into policies that affect the drivers of biodiversity loss. They argued that, for example, agricultural policies with intended pro-conservation aims could in practice function as drivers for biodiversity loss by supporting activities harmful to biodiversity. However, some of the research participants highlighted that the reason for these perverse effects by different sectoral policies, do not primarily lie in the limited coordination across policies or administrative levels, but rather in the tensions or even contradictions between various economic interests and conservation goals (see also Rands et al. 2010). Participants often mentioned the dominant power relationships as a fundamental reason explaining the inclusion of particular interests into policy processes. These power positions, already discussed above, do challenge us to explore even more the dynamics and practices taking place within and across multi-level and multi-sectoral governance structures (Apostolopoulou et al. in press).

Possible ways towards overcoming scale challenges

In order to tackle the identified scale-related challenges of biodiversity conservation, the participants made a number of recommendations.

They called for a new approach based on a more effective combination of fixed and flexible policy objectives. In particular, they argued that there should be a balance between designing 'non-flexible' societal and ecological objectives at the EU or Member State level and providing opportunities for strengthening the adaptive capacity to deal with uncertainty and change across scales. They highlighted the need for a better balance between maintaining the core policy objectives, and providing opportunities for stakeholders to get empowered and educated and to develop innovative solutions.

The participants also recognized that responding to current policy challenges requires a context-sensitive coordination in order to combine top-down policy design and implementation with bottom-up identification of problems and solutions in biodiversity conservation. Therefore, the need for coordination across scales and sectors should not undervalue the way that historical, cultural and local conditions and customs impact on biodiversity conservation creating different needs and opportunities in different settings.

With the aim of strengthening communication, the stakeholders proposed that cross-scale communication platforms would be essential for a new 'biodiversity governance culture' with more active, equal and meaningful local participation. In particular, social learning could be encouraged by creating platforms where stakeholders from different governance levels could share concerns and solutions (c.f., Leys and Vanclay 2011). This generates a need for various social networks to work together in an integrative fashion (Olsson et al. 2007). In this context, establishing thematic net-

works (e.g., for combining implementation, monitoring and appraisal of relevant EU Directives and instruments) was proposed by research participants as a potential way to integrate existing activities. Also, these platforms could be crucial for developing best practice guidance and bridge the gap between the EU, national and local levels on land-use issues related to biodiversity conservation.

Finally, in order to improve cross-sector communication, the participants called for the development of new interdisciplinary approaches (Farrell et al. 2012). For example, they encouraged complementing ecological expertise with geographical and social expertise in land-use planning.

The science-policy discussion in the workshop proved to be a promising forum to present, negotiate and evaluate the research problems and findings between scientists, NGO representatives, policymakers and environmental authorities. The discussions between these actors and their results as presented in this paper illustrate a possible way of opening-up scientific discourses towards 'extended peer communities' (Funtowicz and Ravetz 1993). Opening-up scientific discourses seems to be especially relevant in the cases like biodiversity governance in which the novel scientific knowledge plays a remarkable role, but cannot solve the identified threats and problems as such, without being interpreted, evaluated and implemented in combination with the context-specific knowledge of concrete practices.

Conclusions

We analysed the perspectives of policy makers, practitioners, and researchers with the aim of understanding the variety of views on current and emerging scale-related challenges of biodiversity conservation, as well as exploring opportunities for solving them. The participants of the workshop agreed that addressing the interconnectedness and interactions of scales in different ecological and governance processes is essential for achieving the goal to reduce biodiversity loss.

Our main finding is that scale-related problems, and potential solutions, are all about increasing our understanding of complexity and implementing this new knowledge. Dealing with a number of different scales and scale-mismatches emerging in biodiversity and its governance is unquestionably challenging; it requires an analytical and political framework that enables the simultaneous assessment of drivers, pressures and impacts as well as policy processes and practices at various scales and levels. Additionally, tackling scale challenges requires concrete steps towards the integration of biodiversity policies across governance levels and policy sectors and integrative governance institutions and networks. In the workshop, cross-scale communication platforms were considered as a promising forum to support communication and social learning. However, new, context-specific ideas are still needed to build dynamic governing structures and flexible policy processes to encourage more legitimate, fair, integrative and innovative biodiversity conservation practices.

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